ABSTRACT

A technique for automated design of a corneal surgical procedure includes topographical measurements of a patient's eye to obtain corneal surface topography. Conventional techniques are used to obtain the thickness of the cornea and the intraocular pressure. The topographical information is interpolated and extrapolated to fit the nodes of a finite element analysis model of the eye, which is then analyzed to predict the initial state of strain of the eye and obtain pre-operative curvatures of the cornea. Insertion and thermal shrinkage data constituting the "initial" surgical plan is incorporated into the finite element analysis model. A new analysis then is performed to simulate resulting deformations, stresses, strains, and curvatures of the eye. They are compared to the original values thereof and to the vision objective. If necessary, the surgical plan is modified, and the resulting new insertion or thermal shrinkage date is entered into the model and the analysis is repeated. This procedure is repeated until the vision objectives are met.